U. S. FISH AND WILDLIFE SERVICE

DRAFT COMPATIBILITY DETERMINATION

Use: Retention and maintenance of the Oregon Inlet Terminal Groin for protection of the new bridge replacing the existing the Herbert C. Bonner Bridge (Bridge No. 11) on NC 12 over Oregon Inlet at Pea Island National Wildlife Refuge

Refuge Name: Pea Island National Wildlife Refuge

Establishing and Acquisition Authority (ies): Executive Order 7864 - April 12, 1938

Refuge Purpose(s): " — as a refuge and breeding ground for migratory birds and other wildlife — "

National Wildlife Refuge System Mission:
To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Use: The North Carolina Department of Transportation (NCDOT) is planning to replace the Herbert C. Bonner Bridge (Bridge No. 11) on NC 12 over Oregon Inlet at Pea Island National Wildlife Refuge because it has reached the end of its service life. A Final Environmental Impact Statement and Section 4(f) Evaluation (FEIS) and Record of Decision (ROD) was prepared to evaluate impacts from two basic alternatives under the National Environmental Policy Act (NEPA).

During 2008 FHWA and NCDOT prepared a Final Environmental Impact Statement and a Final Section 4(f) Evaluation presenting the Parallel Bridge/Phased Approach as the least environmentally damaging preferred alternative (LEDPA). Significant and adverse comments from most of the review agencies resulted in FHWA and NCDOT selecting a new preferred alternative identified as the Parallel Bridge/NC 12 Transportation Management Plan. An Environmental Assessment (EA) was prepared to address impacts from this alternative. FHWA and NCDOT concluded the NEPA administrative process with a Record of Decision (ROD) in early 2011. Throughout the entire process and for all alternatives considered, a consistent assumption was that NCDOT would be allowed to retain the Terminal Groin in place.

Analyses conducted for this Compatibility Determination are based upon information presented in the various NEPA documents prepared for the bridge replacement project, scientific literature, personal communications with appropriate scientists, and sound professional judgment by refuge managers, ecologists, coastal geologists, and wildlife biologists. The Refuge assembled a team of coastal experts to analyze the effects of the Terminal Groin on the dynamic inlet system and provide recommendations for offsetting those impacts on refuge resources.

Summary of SDEIS, S-SDEIS, FEIS, & EA Alternatives Analyzed

No Action Alternative (Ferry System)

The analysis presented a discussion for a ferry system designed to transport a resident population of 400 - 450 vehicles per day during summer peak season, when demand between islands meets or exceeds 3,500 vehicles per day. The analysis of this alternative was

predisposed to rejection because it does not meet the project purpose since 3,500 vehicles per day access the barrier island system by ferry from the south or highway/bridge from the north.

Parallel Bridge Corridor with Nourishment

The Parallel Bridge with Nourishment alternative would replace the existing bridge with a new bridge west of the existing alignment and would make landfall at the southern terminus on the refuge within existing right-of-way. In addition, NC 12 would be maintained through the entire length of the refuge within the existing right-of-way. However, based upon modeling done in preparation of the SDEIS, beach nourishment would be required to maintain a minimum modeled distance of 230 feet from the mean high tide line to edge of pavement for protecting the integrity of the highway.

Parallel Bridge Corridor with Road North/Bridge South

The Parallel Bridge with Road North/Bridge South alternative would replace the existing bridge with a new bridge west of the existing alignment and would make landfall at the southern terminus on the refuge to the south and 260 feet west of existing right-of-way. In addition, NC 12 would be relocated to new right-of-way west of the 2060 projected shoreline for 6-7 miles to the south to maintain a minimum buffer width of 230 feet west of the 2060 shoreline. Approximately 2-3 miles of NC 12 in the vicinity of New Inlet would remain unchanged as the required buffer width is projected to remain at or beyond 230 feet through 2060. NC 12 would be relocated to new-right-of-way and reconstructed as a bridge for the last 2 miles of refuge land. The bridge would transect the refuge and waters of Pamlico Sound within the Proclamation Boundary before tying into NC 12 in Rodanthe. Three protective dunes totaling 2,100 feet in length and up to 10 feet in height would be built on an as-needed basis. There is no discussion as to how many times these dunes would need to be re-constructed during the project life or the extent of work activities necessary to maintain the dune system outside of the highway right-of-way.

Parallel Bridge Corridor with All Bridge

The Parallel Bridge with All Bridge alternative would replace the existing bridge with a new bridge west of the existing alignment and would tie into NC 12 at the southern terminus on the refuge 350 feet west of the existing right-of-way. In addition, NC 12 would be maintained by constructing a series of bridges through all hot spot areas and zones with potential for breach formation.

Parallel Bridge with Phased Approach Alternative

There are two alternatives presented in the NCDOT Parallel Bridge with Phased Approach analysis. The two alternatives are: 1) Phased Approach/Rodanthe Bridge Alternative and 2) Phased Approach/Rodanthe Nourishment Alternative. The Phased Approach alternatives would be built in four phases. NCDOT determined the need for each phase from the perspective of the condition of the existing Bonner Bridge, potential breach locations, and the location of the 2060 modeled shoreline based upon an assumed beach erosion rate.

Phase I

The Phase I project would consist of the construction of a new Oregon Inlet bridge parallel and in close proximity to the existing bridge. The beach nourishment component of the Phased Approach/Rodanthe Nourishment Alternative would begin in Phase I,

unless an alternate short-term solution is implemented. Nourishment would then be repeated at four-year intervals or on an as needed basis until all phases of construction are completed, or for the project life.

Phase II (Post 2013)

The Phase II project would consist of constructing three separate bridges within the easement of existing NC 12 in locations where there is a likelihood of a future breach, or the distance from the edge of NC 12's pavement to the active shoreline is predicted to be less than or equal to the buffer width of 230 feet by 2015. The southernmost bridge in Phase II would begin in the refuge near the northern end of the Rodanthe S-Curves Hot Spot (about 1.5 miles north of Rodanthe) and extend into Rodanthe.

The middle bridge in Phase II would be approximately 0.7 mile long. It would be adjacent to the southern half of the Refuge's North Pond, with the southern end being approximately at the northern end of the Sandbag Area Hot Spot

The northernmost bridge in Phase II would be approximately 2.6 miles long. It would tie into the southern end of the Oregon Inlet bridge constructed in Phase I, continue south through the Canal Zone Hot Spot, and end near the northern end of North Pond.

Phase III (Post 2020)

The Phase III project would consist of constructing one bridge within the easement of existing NC 12 through a location where there is a likelihood of a future breach, as well as partially through an area where the distance from the edge of NC 12's pavement to the active shoreline is predicted to be less than or equal to the buffer width of 230 feet by 2020. The Phase III Bridge would be approximately 1.9 miles long and would start near the southern end of South Pond, within the southern portion of the Sandbag Area Hot Spot, and continue to the south past the southern end of the possible future breach in the refuge in this area

Phase IV (Post 2030)

The Phase IV project would consist of constructing two separate bridges within the easement of existing NC 12 in locations where the distance from the edge of NC 12's pavement to the active shoreline is predicted to be less than or equal to the buffer width of 230 feet by 2030.

The southern Phase IV Bridge would be approximately 1.6 miles long. It would be adjacent to New Field and South ponds in an area through most of the Sandbag Area Hot Spot. This bridge would connect the middle Phase II Bridge and the Phase III Bridge

The northern Phase IV Bridge would be approximately 1.0 mile long. It would be adjacent to the northern half of North Pond and would connect the two northern Phase II bridges.

The Parallel Bridge with Phased Approach Alternative was selected as the preferred, or Least Environmentally Damaging Practicable Alternative (LEDPA) in the Final Environmental Impact Statement (FEIS). In response to adverse State and Federal agency comments on the findings of the FEIS, NCDOT and FHwA decided to prepare an Environmental Assessment (EA) to

evaluate a new alternative as the preferred alternative. This alternative is called the Parallel Bridge with NC 12 Transportation Management Plan. A new Section 4(f) evaluation was prepared for this new alternative

Parallel Bridge with NC 12 Transportation Management Plan Alternative

Parallel Bridge: Phase I, or the Parallel Bridge is essentially the same as the alternative described in the Parallel Bridge with Phased Approach Alternative. The most profound change is the southern terminus of the bridge will make landfall outside of existing right-of-way. This is allowable through provisions for minor modifications to existing right-of-way. Phase I can only be considered if the ROW modification is minor and for the purpose of safety.

NC 12 Transportation Management Plan: The EA is very ambiguous as to what the NC 12 Transportation Management Plan (NC 12 TMP) actually is. In places it comes across as a document stating a right to reconsider any previously considered alternative or any combination thereof for maintaining the highway (a status quo planning process), while in other sections it appears to state that the Phased Approach alternatives as presented in the FEIS would be the plan for future phases. There is no mention in the EA of the commitment made in the FEIS to stay within existing ROW except as adopted by reference.

The NC 12 TMP is a conceptual plan to monitor coastal conditions and make decisions about what to do with the highway as need arises. There is no detailed information, including the discussion on coastal monitoring, about this plan in the EA, FEIS, or any other NEPA document prepared to date.

Terminal Groin

The Terminal Groin was constructed by the N. C. Department of Transportation to stabilize the southern shoreline of Oregon Inlet leading to the protection of the southern terminus of the Herbert C. Bonner Bridge. Construction and was completed in March 1991. A permit authorizing the groin/revetment was issued by the USFWS. It is a rock revetment approximately 3,375 feet long and extending from south of the existing bridge and curving to the north and east into the ocean on the north side of the bridge. Of the total length, approximately 2,750 feet of the structure on the ocean end is considered to be terminal groin and approximately 625 feet in the vicinity of the bridge is considered to be a rock revetment.

During the planning process for replacing the existing bridge the NCDOT and FHwA made assumptions requiring that the Terminal Groin remain in place for all alternatives considered. NEPA documents to date, including the Record of Decision, neither adequately addressed physical and biological impacts of the terminal groin nor have they examined the consequences of the groin remaining in place through an indefinite time frame. A Regional Solicitor, after reviewing the terms and conditions of the original permit, determined that a new permit would be required to leave the Terminal Groin in place. The refuge required a thorough review of impacts associated with the groin since construction.

After more than 2 years of discussing with NCDOT and FHWA the need for a thorough analysis of impacts accruing from the Terminal Groin, little to no progress was made. Consequently, the Refuge funded an independent panel of coastal experts to assess the effects of the structure over time and make recommendations for future management to compensate for those impacts. Familiarity with the area, large data files within and in the vicinity or Oregon Inlet, and appropriate expertise led to the selection of Coastal Research Associates for assembling a

team of experts with appropriate scientific expertise to fully address the effects of the terminal groin on inlet dynamics, coastal processes, and wildlife habitat through a contractual agreement with the refuge.

The analysis included a literature survey and summary of beach and barrier island processes, inlet processes, coastal storms, shoreline erosion, and impacts of groins on barrier island systems. The team identified impacts and provided the refuge with recommendations for management to improve habitat quality to partially offset those impacts. Findings and recommendations are summarized within the section heading "Anticipated Impacts".

Availability of Resources:
Allowing the Terminal Groin to remain in place will place additional demand on refuge resources. Staff will be required to monitor habitat in the fillet behind the groin and prepare reports recommending management actions as they become necessary. Additional law enforcement will be required to control public use and prevent impacts within biologically sensitive nesting areas. It is likely that consultation with the Division of Ecological Services Raleigh Field Office under Section 7 of the Endangered Species Act will be necessary, as listed species such as the piping plover, loggerhead sea turtle, and possibly seabeach amaranth, can be affected through habitat management practices relative to operation and maintenance of the Terminal Groin.

There would be considerable expenditures for materials and supplies to collect and analyze data, monitor periodic impacts resulting from the effects of over-stabilizing habitat, maintenance activities, monitoring permit compliance, and coordination with NCDOT over the project life. These issues and processes will manifest themselves through additional demands on refuge staff and budgets.

Anticipated Biological Impacts of Use:
Any of the Parallel Bridge Alternatives or combinations thereof will result in highly significant spatial and temporal impacts on Pea Island National Wildlife Refuge. Spatially, these impacts can be analyzed by beginning at the mean high water line on the north end of the refuge and continuing westward to the edge of the western right-of-way as it exists over time, and then proceeding southward to the refuge boundary at Rodanthe. While it may be argued that this entire area will not be impacted directly, most, if not all of the area will be adversely affected by direct, indirect, and cumulative impacts. In reality, it is more likely that the NC 12 project components, other than the Parallel Bridge will be constructed on an as needed basis and only when threats arise as the document contains reference to need for road relocations and mixing and matching alternatives over the project life. Designing a bridge/highway project around the assumption that the Terminal Groin will remain in place is an excellent example of a project's direct, indirect, and cumulative impact on a premiere national wildlife refuge.

A summary of the findings and recommendations of the Terminal Groin Coastal Expert Panel reveals:

- Terminal groin impacts at Oregon Inlet/Pea Island NWR include:
    - A very rapid decrease in the overall width of the inlet due to the stabilization of the southern inlet shoulder and the continued migration of the northern shoulder on Bodie Island.
    - The terminal groin has altered sediment transport leading to a redistribution of sand, especially into the area behind the groin fillet. This sand is a much finer

sand than normal refuge beach sand which has an impact on habitat quality for filter feeders.

- Sand accumulating in the fillet area downdrift from the groin is measurably finer than the open beach exposures with a higher percentage of dark heavy minerals
- The greatest impact appears to be correlated with redistribution of finer grain sands with a higher heavy mineral content on swash zone invertebrates. Mole crabs and coquina do not survive as well in finer grained substrate so populations have been suppressed since the early 1990's. This has potential for impacting the quality of migratory bird foraging habitat.
- Habitat change was measured by digitizing aerial photography before the groin, immediately after groin construction, and approximately 15 years after groin construction. Data from the GIS analysis were used to develop habitat change indices using STELLA. From this effort, the conclusion was that although habitat has changed, relative proportions of habitat have remained relatively unchanged for species of interest. What has changed is where the habitat is located.
- Habitat within the fillet and behind the groin undergoes rapid succession as the groin disrupts normal overwash processes and sediment transport. Overwash terrace habitat quickly transitions into vegetated dune communities.
- The groin fixed the location of the northern shoreline of the refuge as well as the navigation span channel for the bridge causing the channel to become deeper as the inlet narrows.

- Recommendations in the report include further GIS analysis with additional aerial photography with the use of the STELLA modeling approach. This would be valuable for reducing variability in the estimates of habitat change. Another recommendation includes shoreline monitoring with some revisions to what has been done in the past. Habitat management to ensure species of interest have suitable habitat in the fillet was recommended. Physical and biological monitoring of refuge habitat, including swash zone invertebrates was recommended throughout the refuge.

After reviewing the available information and according to my best professional judgment, I find that issuing a permit to allow the Terminal Groin to remain in place cannot be found compatible without stipulations to offset impacts on refuge land accruing from the structure. Strict adherence to the stipulations listed in this determination and full compliance with all conditions of the permit are mechanisms for making a favorable Compatibility Determination.

Public Review and Comment: Notice of this action shall be published in the News and Observer, Virginia Pilot, Outer Banks Sentinel, Coastland Times, and it will be posted in the Dare County Public Library. In addition the notice will be posted on the Refuge office bulletin board near our main entrance. The notice shall be published for a period of no less than 15 days. Comments will be addressed herein upon receipt and at the end of the comment period.

Determination:

_____ Use is Not Compatible

__X__ Use is Compatible With the Following Stipulations

Stipulations Necessary to Ensure Compatibility: These stipulations were prepared to ensure that the refuge purpose can be achieved with the groin in place. They are based upon

the findings of the panel of coastal experts, coastal ecologists, wildlife biologists and refuge management.

I. SECTION I: *General Conditions*

1) The Service requires that the document *"Environmental Impacts of the Oregon Inlet/Pea Island Terminal Groin"* be incorporated into the Final Environmental Impact Statement/Record of Decision's NEPA administrative record as an accepted reference document.

2) During the period covered by the permit if NCDOT should require the temporary use of additional lands outside the permitted area for purposes of maintaining the structure, such uses shall be considered on a case-by-case basis and may be authorized by Special Use Permit, Letter of Authorization, or other legal instrument subject to the Compatibility Determination policy in effect at time of the proposed use. All temporary uses shall occur in full compliance with the following provisions:

   a. Use of the area will be planned to minimize disturbance, compaction, filling, excavation, vegetation destruction, or other reasonably foreseeable impacts on Refuge lands and waters.

   b. All disturbed areas will be restored to pre-project condition as approved by the Refuge Manager, c/o Pea Island National Wildlife Refuge, P.O. Box 1969, Manteo, North Carolina 27954. NCDOT will mitigate the loss of or impact to any wetlands and for the use of Refuge lands in accordance with Federal law, regulation, and policy to achieve no net loss of wetlands and no reduction in habitat quantity or quality on Refuge land. This will be accomplished through a plan acceptable to the Refuge Manager, c/o Pea Island River National Wildlife Refuge.

   c. Temporary uses granted by the permit shall be for the specific use described and may not be construed to include the further right to authorize any other use within the Refuge boundaries unless approved in writing by the Regional Director.

3) NCDOT has the responsibility for both the Parallel Bridge and NC Highway 12 and maintaining the functional nature of this transportation infrastructure for the Hatteras Island communities. By acceptance of the permit NCDOT will have a continued involvement, in <u>full</u> consultation with the Federal landowners, the U.S. Fish and Wildlife Service and National Park Service, in the Hatteras Island area. The U.S. Fish and Wildlife Service and NCDOT will develop monitoring and management programs, as defined in Sections II and III, to monitor the Refuge habitat and shoreline changes, the function of the terminal groin and revetment, and beach nourishment if it occurs. If the Regional Director, U.S. Fish and Wildlife Service, in consultation with the Secretary, NCDOT, determines that the terminal groin and revetment are causing long-term adverse habitat impacts or shoreline erosion or migration by interrupting or otherwise affecting natural sand migration, or both, NCDOT will have the option to either remove the terminal groin and revetment structures, provide funding for habitat management, or perform additional habitat management actions as described by the Service as necessary to achieve no net

loss of quantity and quality of habitat. All actions will be subject to the approval of the Service.

4) Proposed modification or extension of the terminal groin and revetment will require reevaluation and full compliance with applicable environmental review requirements, before issuance of a new or revised permit will be considered. Any reevaluation shall consider all direct, indirect, and cumulative impacts on the ecological integrity of Refuge land.

5) NCDOT shall fully comply with all terms and conditions of the permit at all times.

Conditions in Section II and Section III are based, in part, upon the findings and recommendations of the report entitled "Environmental Impacts of the Oregon Inlet/Pea Island Terminal Groin" (2010) and is hereinafter referred to as the Terminal Groin Report. This report verifies that the Oregon Inlet Terminal Groin successfully stabilized the southern shoreline of the inlet with respect to southward migration. This success is not without cost as the analysis found that the structure severely disrupts natural inlet processes even transitioning to shoreline processes for considerable distances from the inlet. These impacts can be better quantified and variability in the data can be reduced by expanding the spatial and temporal constraints of the current analysis.

I. SECTION II: *MONITORING CONDITIONS*

1. NCDOT Monitoring Program
   a. NCDOT shall establish a monitoring program prior to the issuance of this permit and as described in the "Record of Decision for NC 12 Replacement of Herbert C. Bonner Bridge (Bridge No. 11) over Oregon Inlet".

      NCDOT shall be responsible for monitoring all physical and biological parameters affected by the Terminal Groin, Parallel Bridge, and NC Highway 12 through the Refuge relative to transportation maintenance needs and impacts to Refuge resources. All monitoring taking place on or through the Refuge shall be done in consultation with the Service and shall be done to the satisfaction of the Regional Director or their designee.

   b. NCDOT shall provide sufficient funding for the purpose of working with coastal experts with appropriate background to refine and publish the Terminal Groin Report through the following measures:
      i. The habitat analysis as completed in this report shall be extended to cover the entire Refuge from the southern boundary at Rodanthe to Oregon Inlet and shall be further extended to encompass Bodie Island from Oregon Inlet to Coquina Beach.
      ii. Aerial photography from 1977, 1992, and 2007 was used to evaluate habitat change on the refuge for the initial Terminal Groin Report. The coastal expert team shall add additional photography to the original analysis to reduce variability in the effort to monitor habitat change and forecast future conditions. Recommended target years for aerial photography shall include in or around 1982, 1987, 1997, and 2002, and 2012 or representative dates selected by the panel of coastal experts and based upon available photography with sufficient resolution to accomplish report objectives.

iii. For the purpose of refining the Terminal Groin Report modeling by this coastal expert team shall be done using STELLA computer software for detecting habitat change both since the Terminal Groin was constructed and for predicting future changes at time intervals not to exceed 15 years or as specified by the Service. This work may be completed either by the same panel of experts that developed the Terminal Groin Report or other experts, whichever is determined appropriate by the Service in consultation with NCDOT. The Service, in consultation with NCDOT, will develop the scope of work for the panel. The panel's work, including travel, data assimilation and analysis, other associated expenses, and report preparation, shall be sufficiently funded by NCDOT.

c. The Service, in consultation with NCDOT, and on a cost re-imbursement basis with funds provided by NCDOT, shall be responsible for assembling a team of coastal experts from appropriate disciplines to analyze physical and biological data collected under Section II: Monitoring Conditions and Section III: Management Conditions of this permit. The purpose of this analysis is to evaluate the effectiveness of monitoring as it relates to transportation maintenance needs and the status of fish and wildlife resources, including habitats, on the Refuge. The Service, in consultation with NCDOT, will develop the scope of work for the panel. The panel's work, including travel, data assimilation and analysis, other associated expenses, and report preparation, shall be sufficiently funded by NCDOT. This work may be completed either by the same panel of experts that refined the Terminal Groin Report or other experts, whichever is determined appropriate by the Service in consultation with NCDOT. Adequate funding shall be provided to the Service on an annual basis for oversight reviews with additional funding provided at 5-year intervals for in-depth reviews and report preparation.

2. Shoreline Monitoring

a. The historic rate of erosion used for previous shoreline monitoring shall be reconsidered and either verified or changed to more accurately reflect shoreline erosion rates in light of climate change and coastal processes affecting them to the satisfaction of the Regional Director. The "historical rate of shoreline erosion" shall be determined through analysis of tidal and sea level rise data compared to shoreline position over time by coastal experts recommended by or agreeable to the Regional Director or their designee. The analysis of the "historical rate of shoreline erosion" and future shoreline prediction methodology shall be initiated prior to signing this permit and shall be completed within 90 days of the date this permit is issued.

b. NCDOT shall provide supplemental beach nourishment on the Refuge beach to restore all sand lost in excess of the "historical rate of shoreline erosion" as determined by the analysis described in II(B)(1) and agreed to by the Service and NCDOT. Beach nourishment shall be required for a monitoring period wherein erosion has exceeded the historic rate of shoreline erosion and shall be done during the appropriate time period. An exception to beach nourishment can be made only if the affected beach has accreted back to the pre-eroded condition prior to the period for dredging and nourishment. Beach nourishment shall be in conformance with Refuge regulation and policy. Full compliance with the terms and conditions of the reasonable and prudent measures to reduce the potential for incidental take of loggerhead sea turtles as described in the Service's biological opinion issued on May 26, 1989, Exhibit G is required.

c. NCDOT shall provide advance written notification to the Refuge Manager no less than 10 days prior to the activity and concerning commencement of all beach nourishment, outlining the time, method, equipment and routes of access, to conduct nourishment operations. Data acceptable to the Refuge Manager regarding sand quantity, suitability, and placement shall be provided prior to placement on the refuge beach. Operations will not commence until the Regional Director or their designee has reviewed and approved the plans for nourishment and issued the necessary permits.

3. Habitat Monitoring

a. The Service, in consultation with NCDOT, will establish a team of scientists to be charged with developing and implementing a geo-spatial monitoring plan to analyze habitat changes on the Refuge, recommend thresholds of habitat change that could trigger management actions, and provide habitat management recommendations for selected species to be used by the Refuge Manager in making future Compatibility Determinations. This team can be the same as the team described in Condition II(A)(3) or it can be a separate team. The Service, in consultation with NCDOT, shall develop the scope of work for the team's efforts on this task. All work completed by the team shall be funded by NCDOT.

Habitat change will be evaluated by this team at 5-year intervals after the baseline is established. Baseline habitat condition monitoring shall commence within 90 days of signing this permit and shall be completed within one year of signing this permit. Habitat change shall be monitored using computer software such as STELLA or a comparable data based computer software modeling system. Monitoring shall be conducted in accordance with the following provisions:

i. The Service, in consultation with NCDOT, shall determine the appropriate professionals to conduct the modeling.

ii. Modeling shall be used as a monitoring tool for change on the Refuge as well as a forecasting tool through incorporation of predictive features such as storm surge, dune migration, and overwash fan development/migration relative to shoreline position for monitoring in real time and for forecasting future scenarios. The Service, in consultation with NCDOT, shall work with the appropriate professionals to determine scenarios to be included in these modeling efforts

iii. Modeling shall further be used as an assessment and forecasting tool to evaluate the need for NC 12 relocation contingent upon a coastal event resulting in a threat to the transportation corridor existing at that time. The Service, in consultation with NCDOT and the professionals conducting the modeling, will determine appropriate analysis scenarios.

iv. Modeling data shall further be used to aid in selecting a future proposed transportation corridor resulting in minimal additional impacts to Refuge lands.

b. NCDOT shall develop a quarterly monitoring methodology, within 30 days of the date of this permit, which is acceptable to and approved by the Regional Director or their designee, to be attached as Exhibit D and made a part hereof, to determine effectiveness of the terminal groin and revetment and any beach nourishment to stabilize the Refuge from a point beginning in the vicinity of South Nags

Head/Coquina Beach on the north side of Oregon Inlet and extending southward to the village of Rodanthe in the vicinity of the refuge southern boundary. Within this zone the following shall occur:

i. NCDOT shall conduct aerial photography four times per year within the zone described herein. Aerial photography shall be of sufficient quality so as to enable completion of tasks described in Condition II(B)(5) and other applicable conditions of this permit.

ii. NCDOT shall be responsible for monitoring physical and biological parameters along transects across the beach at approximately 0.2 mile intervals within the zone described herein. Monitoring transects shall include, but are not limited to, dunes to lowest point of the swash zone.

1) Physical data collection shall include, but is not limited to, dune width and height, beach width, beach slope, sand grain size as determined through one sample from the upper beach, and one sample each from the upper, mid- and lower swash zone, and mineral content of swash zone sand.

2) Biological data collection shall include, but is not limited to beach invertebrates such as the ghost crab, swash zone invertebrates such as the mole crab, coquina, amphipods, and polychaete worms. Observations on other wildlife should be recorded and reported to the refuge especially where nesting birds or turtles are observed.

c. NCDOT will submit an annual report to the Regional Director and Refuge Manager. Reports are due within 60 days of the end of the reporting period for the full term of this permit unless all parties mutually agree to discontinue the reporting requirements. The reporting period commences on the date this permit is accepted and signed by the appropriate authorities from respective agencies.

II. SECTION III: *MANAGEMENT CONDITIONS*

1. NCDOT shall provide equipment and personnel necessary to conduct habitat management actions when the Service determines that habitat conditions for migratory birds or other federal trust species at, adjacent to, or within 0.75 miles of the Terminal Groin have become unsuitable due to the actions of wind or water. The Service shall determine when, where, and type of habitat management actions to be taken. Habitat management is anticipated to involve mostly moving sand to create moist sand and intertidal pool habitat. Moving the sand is likely to occur by:

   a. Mining the sand and using it elsewhere on the Refuge to create a berm for protecting NC Highway 12

   b. Moving the sand to the Refuge beach south of the point of attachment for the Oregon Inlet Ocean Bar.

   Habitat management will be necessary at approximately 5-year intervals, depending upon storm frequency and intensity and it is expected that approximately 200,000 – 300,000 yd^3 would be removed from an area of approximately 25-30 acres as determined necessary by the Refuge Manager.

2. NCDOT shall be responsible for obtaining permits as needed from various regulatory agencies to complete the management actions in Section III(1).

Justification: The original permit authorizing the Terminal Groin was issued to specifically address the issues affecting the bridge existing at the time that permit was signed. Conditions are very specific in stating that the purpose of the permit was to protect the existing bridge and that the groin is to be removed within a 2-year period once the purpose no longer exists. Consequently, once the existing bridge is removed a new permit is required or the groin will have to be removed. Through prudent monitoring and science-based habitat management as stipulated it is believed that the Terminal Groin can remain in place with impacts being partially offset for migratory birds and other wildlife.

NEPA Compliance:

Categorical Exclusion _____.
Environmental Assessment _____.
Environmental Impact Statement __X*__.
FONSI _____.

References

Dolan, R., Dean, R., Hayden, B, McCafferty, H., Erwin, M, Richardson, D., Stewart, D. 2010. Environmental Impacts of the Oregon Inlet/Pea Island Terminal Groin. Coastal Research Associates, Charlottesville, VA. 57pp. plus attachments.

*Federal Highway Administration & North Carolina Department of Transportation. 2010. Record of Decision for NC 12 Replacement of Herbert C. Bonner Bridge (Bridge No. 11) over Oregon Inlet. Federal-Aid No. BRS-2358(15). NCDOT Project Definition: 32635. TIP Project No. B-2500. Dare County, North Carolina

U.S. Fish and Wildlife Service. 2006. Pea Island National Wildlife Refuge Comprehensive Conservation Plan. United States Department of Interior, Southeast Region, Atlanta, GA. 192 pp.

Signature: Refuge Manager: Mike Bryant 8/23/2011
(Signature and Date)

Review: Regional Compatibility Coordinator:_____
(Signature and Date)

Review: Refuge Supervisor:_____
(Signature and Date)

Concurrence: Regional Chief:_____
(Signature and Date)

Mandatory 10- or 15-Year Re-evaluation Date: _____